REMARKS

Claims 1-41 were pending in this application. By way of this amendment and reply to the Office Action mailed February 25, 2003, claims 2, 3, 21, 23 and 24 have been canceled without prejudice or disclaimer, claims 1, 4-20, 22 and 25-41 have been amended, and new claim 42 has been added. Therefore, claims 1, 4-20, 22 and 25-42 are presently pending for consideration at this time.

In the Office Action, claims 14-16, 19, 20, 35-37, 40 and 41 were objected to because of minor informalities noted on page 2 of the Office Action. The presently pending claims have been amended in accordance with the comments made in the Office Action, and it is believed that all of the presently pending claims are unobjectionable.

In the Office Action, claims 16 and 37 were rejected under 35 U.S.C. §112, second paragraph, for the reasons set forth on page 2 of the Office Action. Claims 16 and 37 have been amended by way of this amendment and reply, and it is believed that claims 16 and 37, as amended, fully comply with the requirements set forth in 35 U.S.C. §112, second paragraph.

In the Office Action, claims 1, 2, 4-15, 19, 20-23, 25-36, 40 and 41 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 5,999,646 to Tamagaki; claims 3 and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Tamagaki in view of U.S. Patent No. 6,134,567 to Nakkiran et al.; claims 16 and 37 were rejected under 35 U.S.C. §103(a) as being unpatentable over Tamagaki in view of U.S. Patent No. 6,141,443 to Nakao et al.; and claims 17, 18, 38 and 39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Tamagaki in view of Fan et al. ("Segmentation and Classification of Mixed Text/Graphics/Image Documents). These rejections are traversed with respect to the presently pending claims, for at least the reasons given below.

The present invention according to presently pending claim 1 is directed to an image processing apparatus comprising:

"input means for inputting image data of an original image,

discriminating means for extracting a predetermined region by using a feature of pixels of the image data input from the input means, and for discriminating an attribute of the region:

determining means for, on the basis of the distribution of the regions attribute of which discriminated by the discriminating means, determining the type of the image data as at least one type selected from the group consisting of image data of uniform background, image data of dot background in the entire screen, image data of dot photo only, image data of continuous gradation photo only, image data of which region can be discriminated by rectangle, and image data of which region cannot be discriminated by rectangle; and

means for converting at least one of resolution, compression rate, and number of colors of the image data, depending on the type determined by the determining means."

The input means is exemplified by Image Input Unit 101 shown in Figure 6 of the drawings, or by step ST201 shown in Figure 7 of the drawings, for example.

The discriminating means is exemplified by Region Discriminating Unit 102 shown in Figure 6 of the drawings, or by step ST202 and step ST203 shown in Figure 7 of the drawings, for example.

The determining means is exemplified by Image Type Determining Unit 103 shown in Figure 6 of the drawings, or by step ST204 shown in Figure 7 of the drawings, for example.

The converting means is exemplified by Data Converting Unit 104 shown in Figure 6 of the drawings, or by step ST205 shown in Figure 7 of the drawings, for example.

As described above, the image processing according to claim 1 determines the type of image data on the basis of the distribution of the attributes of the regions of the image data, and the type of image data is selected from the group consisting of image data of uniform background, image data of dot background in the entire screen, image data of dot photo only, image data of continuous gradation photo only, image data of which region can be discriminated by rectangle, and image data of which region cannot be discriminated by rectangle. In accordance with the determined type, the apparatus according to claim 1 converts at least one of resolution, compression rate, and number of colors of the image data. In accordance with the type of image data, the apparatus performs image data correction, wherein it is subject to appropriate resolution conversion and filtering.

Tamagaki discloses that image data is processed in accordance with its type. However, Tamagaki does not disclose or suggest all of the features recited in claim 1. As described above, the apparatus according to claim 1 determines the type of image data on the basis of the distribution of the attributes of the regions of the image data, and the type of image data is selected from the group consisting of image data of uniform background, image data of dot background in the entire screen, image data of dot photo only, image data of continuous gradation photo only, image data of which region can be discriminated by rectangle, and image data of which region cannot be discriminated by rectangle. In accordance with the determined type, the apparatus according to claim 1 converts at least one of resolution, compression rate, and number of colors of the image data. Since Tamagaki fails to disclose these features of claim 1, Tamagaki does not enable image data correction (wherein it is subject to appropriate resolution conversion and filtering) to be performed in accordance with the type of image data.

Nakkiran et al. discloses a printer apparatus which changes the resolution of image data in accordance with the type of an image. However, Nakkiran et al. does not rectify the above-mentioned shortcomings of Tamagaki.

Nakao et al. discloses a character extraction apparatus and shows the use of rectangle information. However, Nakao et al. does not rectify the above-mentioned shortcomings of Tamagaki.
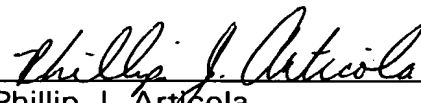
Fan et al. discloses an image processing apparatus using page information. However, Fan et al. does not rectify the above-mentioned shortcomings of Tamagaki.

Therefore, since independent method claim 22 and new independent apparatus claim 42 also recite features (discussed above with respect to claim 1) that are not disclosed or suggested by any of the cited art of record, all of the presently pending claims are believed to be in allowable form.

Applicant believes that the present application, is now in condition for allowance, and an early indication of allowance is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

Date _23 May, 2003_

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MARKED UP VERSION SHOWING CHANGES MADE

Below are the marked up amended claims:

1.　　(Amended)　An image processing apparatus comprising:

input means for inputting image data of an original image;

discriminating means for extracting a predetermined region by using a feature of pixel of the image data input from the input means, and for discriminating an attribute of the region;

determining means for, [determining the type of the image data] on the basis of the distribution of the regions attribute of which discriminated by the discriminating means, [; and

processing means for processing the image data as specified depending on the type of the image data determined by the determining means.]

determining the type of the image data as at least one type selected from the group consisting of image data of uniform background, image data of dot background in the entire screen, image data of dot photo only, image data of continuous gradation photo only, image data of which region can be discriminated by rectangle, and image data of which region cannot be discriminated by rectangle; and

means for converting at least one of resolution, compression rate, and number of colors of the image data, depending on the type determined by the determining means.

4.　　(Amended)　An image processing apparatus according to claim 1, [wherein the processing means includes] further comprising:

correcting means for correcting the image data by performing at least one of density conversion and filter processing, depending on the type determined by the determining means.

5.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

changing means for changing the image format of the image data, depending on the type determined by the determining means.

6.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

processing means for selecting an application of image processing, depending on the type determined by the determining means, setting a parameter, and starting [this] <u>the</u> application to perform image processing of the image data.

7.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

means for performing specified processing on the basis of the attribute of the region discriminated by the discriminating means, on the image data in every region, when the determining result by the determining means is a specified result.

8.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

second discriminating means for discriminating the image type of the image data received from the input means in pixel unit, when the determining result by the determining means is a specified result; and

second processing means for processing the image data as specified, on the basis of the result discriminated by the second discriminating means.

9.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

setting means for setting for pixel unit discriminating process on the basis of the determining result by the determining means;

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second discriminating means for discriminating the image type of the image data received from the input means in pixel unit on the basis of the setting by the setting means, when the determining result by the determining means is a specified result; and

second processing means for processing the image data as specified, on the basis of the result discriminated by the second discriminating means.

10.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

second discriminating means for discriminating the image type of the image data received from the input means in pixel unit, when the determining means determines that it takes more than a specified time for determining; and

second processing means for processing the image data as specified, on the basis of the result discriminated by the second discriminating means.

11.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

second discriminating means for determining the discrimination precision of the discriminating means, and when [this] <u>the</u> discrimination precision is below a specific value, discriminating the image type of the image data received from the input means in pixel unit; and

second processing means for processing the image data as specified, on the basis of the result discriminated by the second discriminating means.

12.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

second discriminating means for determining the complicatedness of the discriminating means, and when [this] <u>the</u> complicatedness is above a specific value, discriminating the image type of the image data received from the input means in pixel unit; and

second processing means for processing the image data as specified, on the basis of the result discriminated by the second discriminating means.

13. (Amended) An image processing apparatus according to claim 1, further comprising:

storing means for receiving the image data from the input means, performing a first process on the image data parallel to the determining process of the determining means to obtain a first result, further performing a second process different from the first process to obtain a second result, and storing them in a memory region; and

means for reading out and outputting either one of the first result and second result from the storing means on the basis of the determining result of the determining means.

14. (Amended) An image processing apparatus according to claim 1, [wherein the discriminating means and judging means include] further comprising:

means for discriminating the structure of the background from the extracted region, and judging the type of the image data on the basis thereof.

15. (Amended) An image processing apparatus according to claim 1, [wherein the judging means includes] further comprising:

means for judging presence or absence of character from the distribution of attribute in each region discriminated by the discriminating means, and judging the type of the image data on the basis thereof.

16. (Amended) An image processing apparatus according to claim 1, [wherein the judging means and processing means include] further comprising:

judging means for judging [the rectangle information and] the type of the image data on the basis of the distribution of the attribute in each region discriminated by the discriminating means; and

processing means for processing the data as specified on the basis of [the rectangle information and] the type of the image data judged by the judging means.

17.   (Amended)   An image processing apparatus according to claim 1, [wherein the determining means includes] <u>further comprising</u>:

means for discriminating the page information which is the image type of each page of the original image of the image data when the discriminating means cannot divide the image data into a plurality of rectangular regions, and determining the type of the image data on the basis thereof.

18.   (Amended)   An image processing apparatus according to claim 1, [wherein the determining means includes] <u>further comprising</u>:

means for discriminating the page information which is the image type of each page of the original image of the image data when the region extracted by the discriminating means has a complicatedness more than a specific value, and determining the type of the image data on the basis thereof.

19.   (Amended)   An image processing apparatus according to claim 1, [wherein the judging means includes] <u>further comprising</u>:

judging means for judging the type of the image data, regardless of the content of the original mode given from the user, on the basis of the distribution of the attribute of each region discriminated by the discriminating means.

20.   (Amended)   An image processing apparatus according to claim 1, [wherein the processing means includes] <u>further comprising</u>:

second discriminating means for discriminating the image information of the image data received from the input means in the pixel unit according to the judging result when the judging result by the judging means is the specified result; and

second processing means for processing the image data as specified on the basis of the discrimination result discriminated by the second discriminating means.

22.   (Amended)   An image processing method comprising:

input step of inputting image data of an original image;

discriminating step of extracting a predetermined region by using a feature of pixel of the image data input at the input step, and for discriminating an attribute of the region;

determining step of determining the type of the image data on the basis of the distribution of the attributes of the regions discriminated at the discriminating step[; and

processing step of processing the image data as specified depending on the type of the image data determined at the determining step] as at least one type selected from the group consisting of image data of uniform background, image data of dot background in the entire screen, image data of dot photo only, image data of continuous gradation photo only, image data of which region can be discriminated by rectangle, and image data of which region cannot be discriminated by rectangle; and

converting step of converting at least one of resolution, compression rate, and number of colors of the image data, depending on the type determined at the determining step.

25.   (Amended) An image processing method according to claim 22, [wherein the processing step includes] further comprising:

correcting step of correcting the image data by performing at least one of density conversion and filter processing, depending on the type determined at the determining step.

26.   (Amended) An image processing method according to claim 22, [wherein the processing step includes] further comprising:

changing step of changing the image format of the image data, depending on the type determined at the determining step.

27.   (Amended) An image processing method according to claim 22, [wherein the processing step includes] further comprising:

processing step of selecting an application of image processing, depending on the type determined at the determining step, setting a parameter, and starting [this] the application to perform image processing of the image data.

28.   (Amended)   An image processing method according to claim 22, [wherein the processing step includes] further comprising:

step of performing specified processing on the basis of the attribute of the region discriminated at the discriminating step, on the image data in every region, when the determining result at the determining step is a specified result.

29.   (Amended)   An image processing method according to claim 22, [wherein the processing step includes] further comprising:

second discriminating step of discriminating the image type of the image data received from the input step in pixel unit, when the determining result at the determining step is a specified result; and

second processing step of processing the image data as specified, on the basis of the result discriminated at the second discriminating step.

30.   (Amended)   An image processing method according to claim 22, [wherein the processing step includes] further comprising:

setting step of setting for pixel unit discriminating process on the basis of the determining result at the determining step;

second discriminating step of discriminating the image type of the image data received from the input step in pixel unit on the basis of the setting at the setting step, when the determining result at the determining step is a specified result; and

second processing step of processing the image data as specified, on the basis of the result discriminated at the second discriminating step.

31.   (Amended)   An image processing method according to claim 22, [wherein the processing step includes] further comprising:

second discriminating step of discriminating the image type of the image data received from the input step in pixel unit, when it is determined that it takes more than a specified time for determining at the determining step; and

second processing step of processing the image data as specified, on the basis of the result discriminated at the second discriminating step.

32.   (Amended) An image processing method according to claim 22, [wherein the processing step includes] <u>further comprising</u>:

second discriminating step of determining the discrimination precision at the discriminating step, and when [this] <u>the</u> discrimination precision is below a specific value, discriminating the image type of the image data received from the input step in pixel unit; and

second processing step of processing the image data as specified, on the basis of the result discriminated at the second discriminating step.

33.   (Amended) An image processing method according to claim 22, [wherein the processing step includes] <u>further comprising</u>:

second discriminating step of determining the complicatedness at the discriminating step, and when [this] <u>the</u> complicatedness is above a specific value,

discriminating the image type of the image data received from the input step in pixel unit; and

second processing step of processing the image data as specified, on the basis of the result discriminated at the second discriminating step.

34.   (Amended) An image processing method according to claim 22, further comprising:

storing step of receiving the image data from the input step, performing a first process on the image data parallel to the determining process at the determining step to obtain a first result, further performing a second process different from the first process to obtain a second result, and storing them in a memory region; and

step of reading out and outputting either one of the first result and second result stored at the storing step on the basis of the determining result at the determining step.

35.   (Amended)   An image processing method according to claim 22, [wherein the discriminating step and judging step include] further comprising:

step of discriminating the structure of the background from the extracted region, and judging the type of the image data on the basis thereof.

36.   (Amended)   An image processing method according to claim 22, [wherein the judging step includes] further comprising:

step of judging presence or absence of character from the distribution of attribute in each region discriminated at the discriminating step, and judging the type of the image data on the basis thereof.

37.   (Amended)   An image processing method according to claim 22, [wherein the judging step and processing step include the steps of] further comprising:

judging [the rectangle information and] the type of the image data on the basis of the distribution of the attribute in each region discriminated at the discriminating step; and

processing the data as specified on the basis of [the rectangle information and] the type of the image data judged at the judging step.

38.   (Amended)   An image processing method according to claim 22, [wherein the determining step includes] further comprising:

step of discriminating the page information which is the image type of each page of the original image of the image data when the discriminating step cannot divide the image data into a plurality of rectangular regions, and determining the type of the image data on the basis thereof.

39.　(Amended)　An image processing method according to claim 22, [wherein the determining step includes] <u>further comprising</u>:

step of discriminating the page information which is the image type of each page of the original image of the image data when the region extracted at the discriminating step has a complicatedness more than a specific value, and determining the type of the image data on the basis thereof.

40.　(Amended)　An image processing method according to claim 22, [wherein the judging step includes] <u>further comprising</u> a judging step of judging the type of the image data, regardless of the content of the original mode given from the user, on the basis of the distribution of the attribute of each region discriminated at the discriminating step.

41.　(Amended)　An image processing method according to claim 22, [wherein the processing step includes] <u>further comprising</u>:

second discriminating step of discriminating the image information of the image data received from the input means in the pixel unit according to the judging result when the judging result at the judging step is the specified result; and

second processing step of processing the image data as specified on the basis of the discrimination result discriminated at the second discriminating step.